

# Project Fact Sheet

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## *Design, Develop and Demonstrate Small Modular Flex-Microturbine*

### GOALS

- Improve cost competitiveness of the biomass energy conversion technologies, and reducing costs of California's electricity.
- Improve environmental and public health costs/risk of California's electricity by mitigating air quality impacts and reducing environmental risks.
- Improve the reliability/quality of California's electricity by developing a new distributed generation technology.



### PROJECT DESCRIPTION

The purpose of this project is to design, develop and demonstrate a Flex-Microturbine™ that will run on different biomass fuels:

- biogas generated from anaerobic digestion of livestock manure;
- producer gas generated from thermal gasification of orchard and forest residues; and
- biogas from landfill gas recovery system.

This project is Phase II of small modular biomass (SMB) initiative co-funded by the National Renewable Energy Laboratory (NREL)/US Department of Energy (US DOE). In this Phase II, the Contractor will design, develop and demonstrate a proof of concept (POC) and three prototypes of Flex-Microturbine™. Prototype 1 will be fueled from biogas generated from anaerobic digestion of livestock manure. Prototype 2 will be fueled from producer gas generated from thermal gasification of orchard and forest residues. Prototype 3 will be fueled from landfill gas. Prototypes 1 and 2 are funded by PIER and co-funded by NREL/US DOE. Prototype 3 is funded by NREL/US DOE only and not part of the PIER project.

The technical objective of this project is to design, develop and demonstrate a Flex-Microturbine™. The turbine will have the ability to run on low pressure and low Btu gases from biogas generated from the anaerobic digestion of livestock manure, from producer gas generated by thermal gasification of orchard and forest residues, and biogas from landfill gas recovery systems.

The prototypes will demonstrate at least 25% gas-to-electricity efficiency (13,684 btu/kWh LHV) and will be able to run on low quality gas from 8 hours to 30 days.



## **BENEFITS TO CALIFORNIA**

This new Flex-Microturbine™ is intended to act as safe, reliable, clean, cost-competitive provider of renewable energy with particular value to California's deregulated electricity marketplace.

## **FUNDING AMOUNT**

Commission	\$983,653
Match Funding	\$2,546,035

## **PROJECT STATUS**

This is ongoing project. A project advisory board meeting and a test demonstration was performed at the Capstone facilities in Van Nuys, California to review the test results of the POC Flex-Microturbine. The POC was demonstrated to operate :

- on a mixture of hydrogen and carbon monoxide up to 15 kW in steady state under manual control
- on natural gas diluted with air down to 1.5 percent methane up to 25 kW
- Flex-Microturbine speed was raised to 96,000 rpm and the fuel concentration increased to 1.75 percent methane. Power output peaked at 35 kW.

The design of the Prototypes 1 and 2 is changed to accommodate significantly greater volume of needed catalyst.

## **FOR MORE INFORMATION**

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